



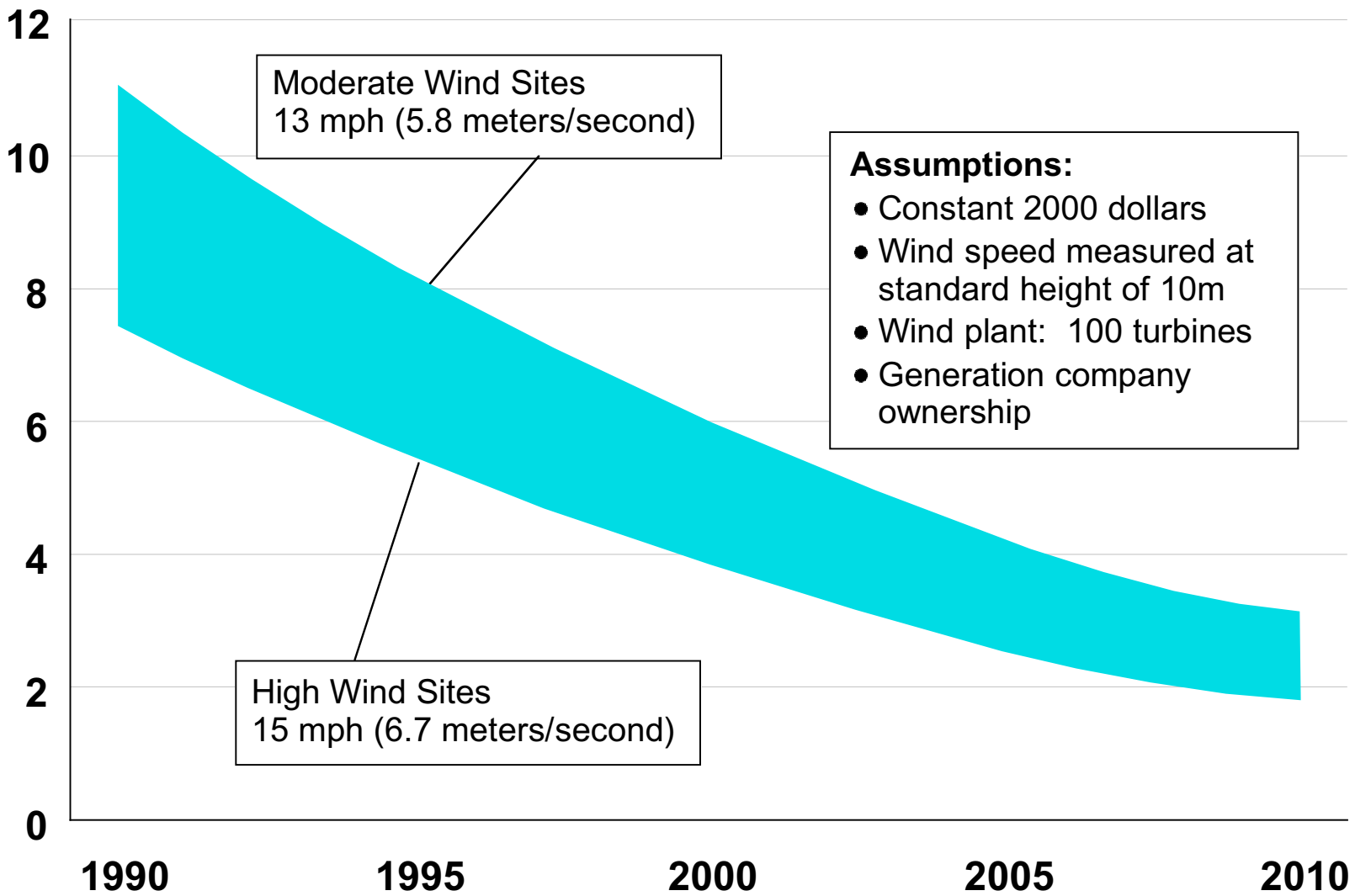
# What Does Wind Energy Really Cost?

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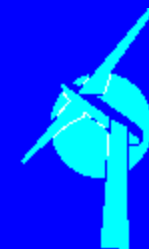


## But... *It really depends*

- Location
- Finances and Incentives
- Number and size of turbines
- What does cost include?



*Costs not completely open and public*





# Location, Location, Location

- Resource

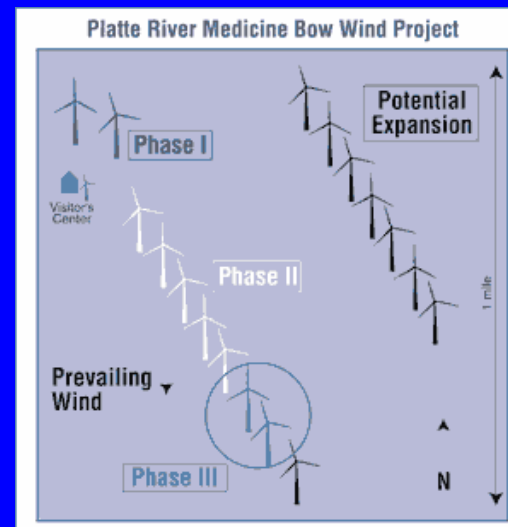
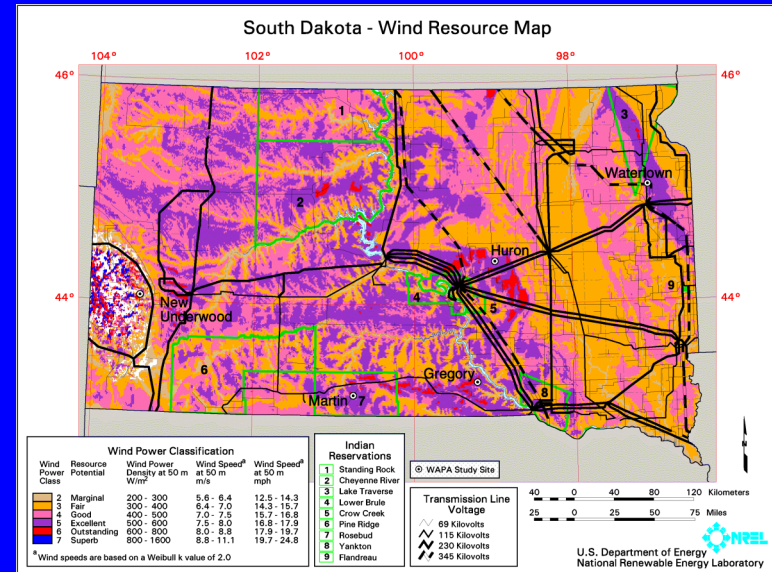
- 1 mph in average speed is ~ 0.5 cents/kWh
- Raising tower from 50 to 100m increases kWh ~15% or more in class 4-5
- Coincidence of wind with load increases value

- Permitting

- private vs. public land
- state and local regulations

- Existing site expansion

- low cost option





# Finances and Incentives

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- Production Tax Credit
  - 1.7 cents/kWh (escalating) for 10 years equates to around 1.1 cents/kWh reduction in contract price
  - deadline pressure *increases* costs
- State and Local tax, etc. can be significant
  - +/- 0.5 cents/kWh impact
- Public Power (100% debt at tax free rates) can be 60% of GenCo or IPP cents/kWh
- Renewable Energy Production Incentive
  - annual appropriations problem leads to little impact





# Plant and Turbine Size

- Spread “nearly fixed” costs: permitting, crane, legal and other soft costs
- Volume discount from manufacturer
- Economies of scale can bring O&M to under 0.2 cents/kWh
- Next generation of 1.2-2.0 MW machines are 10-15% cheaper/kW





# What does the price include?

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## Additional Factors

- Point of delivery: *bus bar or include transmission?*
- Resource Assessment, Land and permitting: *sometimes provided*
- Ancillary services ??

## Cost Semantics

- Inflation (constant or current dollars)
- Hardware only, overnight construction, or turn-key cost
- Levelized or initial cost

can be significant additions for marketing, etc. on retail side







# Conclusions

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- The wind industry is delivering  $\sim 3$  cent/kWh contracts, including PTC
- This price is not realistic for many situations, particularly small projects in new locations
- For green markets, lowest price does not seem to be the only driver

